Further Notes on the Gingin Chalk, by **L. Glauert,** F.G.S., in charge of geological collections, Western Australian Museum, Perth.

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The present paper is mainly intended as a record of the definite identification of the Gingin series at Dandarragan, some fifty miles north of Gingin, during a short visit to "Kayanaba" Dandarragan rendered possible through the kindness of Messrs. C. Roberts and C. L. E. Orton to whom I gratefully express my indebtedness.

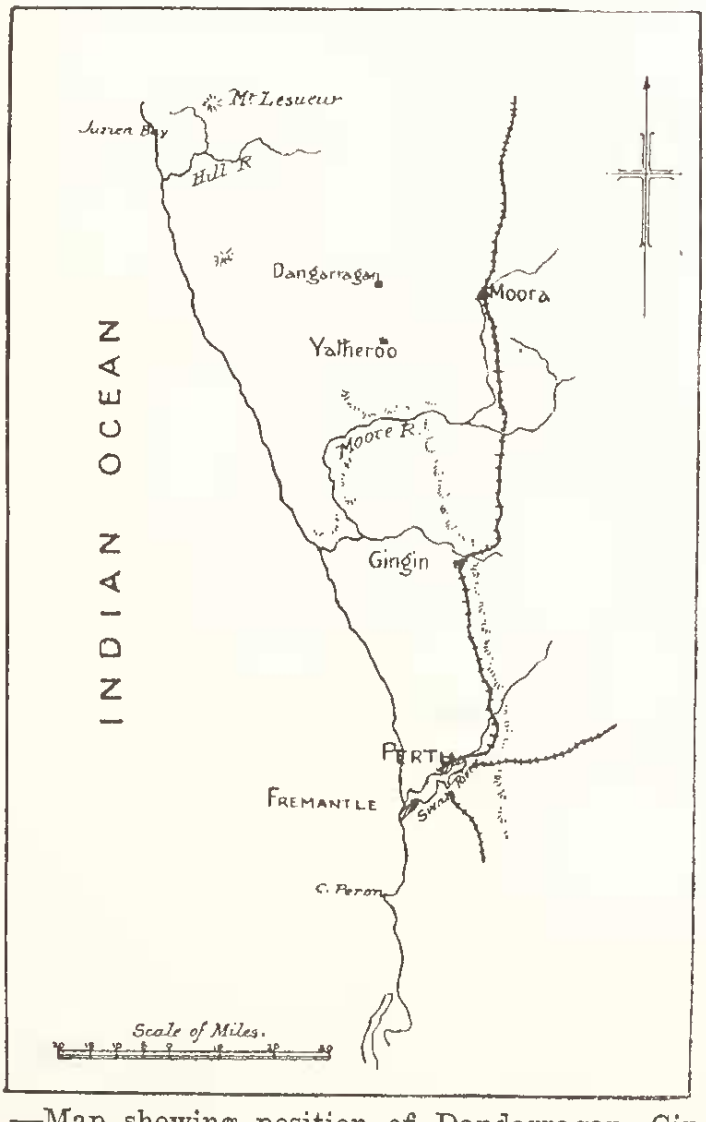

FIG. 1.—Map showing position of Dandarragan, Gingin, etc.

The presence of Chalk in the vicinity of Dandarragan and Yatheroo has long been suspected. Gregory's map of 1860*, published in 1861, shows patches of "Chalk" and Sandstone containing flints and Cretaceous fossils" at Gingin and Yatheroo. H. Y. L. Brown in his General Report of 1873 refers to "the white chalky limestone of Gin Gin, Yatheroo and Dandarragan" of Mesozoic age.

In 1907 Mr. W. D. Campbell examined "the Phosphatic Deposits near Dandaraga (1907), in his report he mentions a series of limestone hills capped with laterite and describes two patches of limestone. Loc. 1137 near Emu Hill and Locs. 823, 867 (Whitfields), a few miles to the south of Emu Hill, but beyond comparing "the characteristics of the bone bed series with the ferruginous sandstones of Greenough River district which contain Jurassic fossils" makes no reference to the probable age of the limestone and its associated beds.

Three years later, Campbell states (1910, p 64) "the Dandaraga ferruginous Sandstones are probably.....of Jurassic age, while the Limestones eastward and northward from there are possibly Cretaceous."

In 1912 Dr. E. S. Simpson proved the "bones" of Campbell's bone beds to be pieces of fossil wood "provisionally classed as *Cedroxylon*," (1912 p 36).

Mr. T. Blatchford's report on "the Possibility of obtaining Artesian Water in the vicinity of Moora," (1912 p. 60), contains the statements "Samples collected from these deposits (the limestones at Dandarragan and Yatheroo) show the presence of fossil shells which are identical with those found in similar limestone beds of Gingin, and it seems certain that they are of the same geological age, i.e. Cretaceous, and in fact are a continuation of the same beds. A specimen of the rock collected from near Yatheroo homestead, on close examination was found to contain the following:—Fragments of *Inoceramus* shells, rounded black nodules, and green specks and stains. The remnants of the *Inoceramus* shells occur in small flat fragments resembling somewhat tubular secondary minerals. They are very frequent in their occurrence in the Gingin series, where they have been found almost complete," and (ib. p 61) "Two specimens collected from a limestone hill near Kajamba (Kayanaba) and presented by Mr. E.

* For a Bibliography of the Gingin Chalk prior to 1910 see Glauert, "The Geological Age and Organic Remains of the Gingin Chalk" in Geol. Surv. W.A. Bulletin 36. Palaeontological Contributions III., Art VIII., 1910. A list of more recent publications dealing with the subject and others referred to in the text, is appended to this paper.

Roberts, junr., showed some fine fossil remains of *Ostrea*.... These fossil remains resemble in every characteristic such as are found in the Chalk deposits of Gingin.''

Mr. A. Gib'. Maitland (1924 p 39) sums up the position as follows:—''In the neighbourhood of Dandarragan is a belt of white chalky limestone.....which there seems some sound reason for believing to be the northern extension of the Gingin beds.'' Mr. Mailtand's caution is fully justified for lithological characters and such vague palaeontological evidence as ''fragments of *Inoceramus*'' and ''specimens of *Ostrea*'' do not warrant a more definite statement .

The Gingin series at Dandarragan occupies a strip of country several miles in width running in a northerly direction from Yatheroo. It consists of horizontally bedded chalk, ''greensands,'' marls, clays, etc., with occasional bands of more resistant ferruginous sandstone and compacted layers of phosphatic nodules, and is covered in places with the remnants of an unconformable lateritic capping.

As a result of irregular demudation, two series of low hills have been developed, the westerly ridge, according to Campbell, being capped with sandstones, whilst the undulating eastern series, in the district that I examined, are in part protected by lateritic material.

The rich black soil resulting from the disintegration of the chalk and the gravelly residue of the weathered laterite usually obscure the underlying rocks on the hill sides, but the steep gullies so characteristic of the ''limestone country'' often present interesting sections. In a short gully on the northern side of Round Hill, ''Kayanaba'' an exposure of chalk bearing fragments of *Inoceramus* was considered suitable for further investigation, I therefore selected a site and made an interesting collection from a band of approximately twelve inches in thickness, situated about three feet above the base of th exposure. As the relationship of this exposure to the chalk as a whole is not determined, the position of the ''zone'' is also uncertain.

Great care was taken whilst the collection was being made and, though a number of small forms were lost, because of the strong wind that was blowing, these, fortunately, were mostly recognised as belonging to the commoner species. The specimens obtained include the common *Trigonosemus, Magadina, Magas, Mytilus, Inoceramus, Camptonectes* as well as *Uintacrinus, Marsupites*, Echinid spines, etc

No special search was made for Microzoa, such as Foraminifera and Ostracoda, but about twenty Foraminifera were obtained

belonging to the genera *Frondicularia, Nodosaria and Cristellaria.*

Up to the present no specimens of *Serpula pyramidalis* (Eth. fil.) * so plentiful at Gingin, has been found at Round Hill.

Ammonites and Fish remains also seem to be absent from the zone.

The Round Hill fauna, as far as known at present, is briefly discussed below and a list has been prepared in which the faunas of the various Gingin outcrops and of Round Hill, Dandarragan, are tabulated side by side.

Peronidella globosa (Eth fil)

Peronella (?) globosa, Eth. fil.(1913), p. 10, pl IV figs. 1 and 2.

A single specimen of a sponge which seems to be identical with Etheridge's species was obtained at Round Hill, it has been sent to the British Museum for confirmation.

Porosphaera globularis (Phil)

Millipora globularis. Phillips (1829) Pl. 1, fig. 12.

One specimen of this curious little organism was collected, it agrees in every respect with specimens in the W.A. Museum from Sussex, England.

Cidaris sp.

Cidaris sp. Etheridge junr. (1913). p 11, Pl. 1, figs. 9-15a.

Many Echinid spines similar to those figured by Etheridge are in the collection. No plates were seen.

Uintacrinus sp.

Uintacrinus sp. Withers (1924). P. 15, pl. III, figs. 4-10.

Seven fragments undoubtedly belong to this very characteristic genus.

Marsupites sp.

Marsupites sp. Glauert (1925).

One corroded plate, similar to some of those exhibited before the Society in August last, was found at Round Hill.

**Serpula pyramidalis*=*Tubulostium pyramidale,* Etheridge junr., 1913 p. 21, Pl. III, figs. 3a-3c. This may prove eventually to be identical with *Serpula turbinella*, J. de C. Sowerby, Mineral Conchology of Great Britain, Part CXI, 1844, p 54, Pl 635 fig6.

Serpula ampullacea Sow.

Serpula ampullacea Sow. (1829), p. 199, pl. DXCVII, figs 1-5.

Spirulaca gregarea. Eth. fil, (1913), p. 13, pl. I, figs. 1-7.

A single specimen of the sub-conical variety was obtained. When compared with the Cretaceous Annelids in the Tennant Collection, now in the Western Australian Museum, its resemblance to a specimen of *S. ampullacea* was so marked that identity was suggested at once. The specimens of Etheridge's *S. gregarea* from Gingin were then compared with the English specimens and found to fall within the range of variation recognised in that species.

Terebratulina ovata Eth fil.

Terebratulina ovata. Eth. fil. (1913), p. 14, pl. II, figs. 18-19.

Three specimens of this small shell were obtained, the collection also contains several larger individuals with simple echinate costae which may prove to be the adults of this species.

Magadina cretacea (Eth fil).

Magasella cretacea. Eth. fil. (1913), p. 16, figs. 9-12.

Magadina cretacea. Thomson (1915), p. 400, figs. 9a-c.

This is the commonest fossil at Round Hill, it is, if anything even more abundant than at Gingin, and is usually present in a perfect state of preservation.

Trigonosemus acanthodes Eth fil.

Trigonosemus acanthodes. Eth. fil. (1913), p. 15, pl. II, figs. 1-4.

After the preceding this is the most plentiful Brachiopod in the zone on Round Hill, the specimens are generally in good condition.

Magas mesembrinus Eth fil.

Magas mesembrinus. Eth. fil (1913), p. 15, pl. II, figs. 5-8a.

Rather rare, but more abundant than at Gingin.

Undetermined Brachiopods.

These include several forms not yet met with in the chalk at Gingin The abundance of Brachiopoda in the zone on Round Hill would almost warrant the designation Brachiopod Band.

Ostrea sp "b"

Ostrea sp "b." Eth. fil. (1913), p. 17, pl. II, figs. 19-21.

Remains of small *Ostrea* spp. are very common, they are usually fragmentary. One or two specimens seem to resemble Etheridge's species "a" (ib. p. 17, pl. IV, figs. 8-9).

Gryphaea vesicularis Lamk

The series from Round Hill contains two more or less imperfect very globose, auriculate shells with the lower umbo truncated, these shells are considerably larger than the specimens of the Gingin *Pycnodonta ginginensis* of Etheridge in the Museum collection and closely resemble English specimens of *Gryphaea vesicularis.*

Camptonectes ellipticus Eth fil.

Camptonectes ellipticus. Eth. fil. (1913), p. 19, pl. I, figs. 16-16a.

This shell is very abundant but on account of its very delicate nature is very difficult to remove intact.

Pecten spp.

Several fragmentary Pectens, quite distinct from the preceding, were obtained, at least two species seem to be represented.

Inoceramus sp.

The characteristic tabular fragments of *Inoceramus* shells are common in the zone.

Mytilus piriformis Eth fil.

Mytilus piriformis. Eth. fil. (1913), p. 21, pl. II, figs. 22, 23.

Small intact valves of this species are not rare, eight are in the collection.

Calantica (Scillaelepas) ging'nensis (Eth fil).

Pollicipes (?)ginginensis. Eth. fil. (1913), p. 13, pl. III, figs. 4, 5.

Calantica (Scillaelepas) ginginensis Withers (1913), p. 64, pl. I.

Three valves, presumably belonging to this species, were obtained at Round Hill, together with two others which seem to me to belong to a different genus, they have been sent to Mr. T. H. Withers of the British Museum for examination.

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FAUNA OF THE GINGIN CHALK (excluding Foraminifera and Ostracoda).

	One Tree Hill Gingin.	Mo e Cap Hill Gingin.	Moorgup Slope Gingin	Yatheroo.	Round Hill Dandarragan.
Peronidella (?)globosa (Eth. fil.)	1	—	—	—	1
Porosphaera globularis (Phil.)	—	—	—	—	1
Coelosmilia (?) ginginensis (Eth. fil.	2	—	—	—	—
Echinid spines (?)Cidaris sp.	C	C	C	—	C
Cidaris comptoni Glauert	R	R	—	—	—
Uintacrinus sp.	M	M	?	—	7
Marsupites sp.	R	R	R	—	1
Serpula ampullacea Sow	C	M	?	—	1
Serpula fluctuata J. de C. Sow	1	—	—	—	—
Serpula pyramidalis (Eth. fil.)	C	C	?	—	—
Spirorbis sp.	R	R	—	—	—
Terebratulina ovata Eth. fil.	M	M	—	—	3
Magadina cretacea (Eth. fil.)	V.C.	V.C	C	—	20
Trigonosemus acanthodes Eth. fil.	M	M	?	—	16
Magas mesembrinus Eth. fil.	M	M	?	—	5
Brachiopods, several new forms	R	R	?	—	20
Ostrea sp. a	R	R	?	?	2
Ostrea sp. b	M	M	?	?	9
Gryphaea vesicularis Lamk=?	—	—	—	—	2
Pycnodonta ginginensis Eth. fil.	C	C	?	—	—
Camptonectes ellipticus Eth. fil.	M	R	?	—	V.C
Pecten spp.	R	—	—	—	4
Inoceramus spp.	VC	VC	C	M	VC
Mytilus piriformis Eth. fil.	C	C	?	—	8
Ammonite remains	M	—	—	—	—
Calantica (Scillaelepas) ginginensis (Eth. fil.)	R	R	?	—	3
Cirripede valves	—	—	—	—	2
? Elytrum of Beetle	1	—	—	—	—
Teeth of Shark	R	M	—	—	—
Teeth, Scales, etc. of Fishes	M	M	?	—	—

R=rare. M=moderately common.
C=common. V.C.=very common.

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